United States Department of Commerce
National Institute of Standards and Technology

~ *Certificate of Measurement Traceability* ~

For

***Demonstrated Areas of Proficiency**

Mass
Echelon II
Echelon III

Volume
Gravimetric and
Volume transfer

Arizona

a participant in the NIST Weights and Measures Measurement Assurance Program for the Year(s)

2003 - 2004

The State standards are traceable to NIST and the laboratory has demonstrated* measurement proficiency through training and interlaboratory comparisons.

Henry V. Oppermann, for the National Institute of Standards and Technology

Chief, Weights and Measures Division
Title

January 1, 2003
Effective Date

UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899-

December 17, 2002

MEMORANDUM FOR Interested Parties

From: Georgia L. Harris
Weights and Measures Division

Subject: State of Arizona Metrology Laboratory Measurement Traceability Status

Laboratory customers regularly request detailed information and authentication of NIST Test Numbers issued to the Arizona Metrology Laboratory to meet audit requirements. This letter provides essential information regarding the traceability of measurement services provided by the Arizona Metrology Laboratory.

Primary Standards and Equipment

Primary standards and equipment have been issued to the Arizona Metrology Laboratory. The State maintains standards of mass, and volume. Valid NIST Test Numbers have been issued to Arizona and are on file at NIST and at the Arizona Metrology Laboratory. The laboratory standards and equipment are used and maintained in a suitable environment. Laboratory personnel are trained in and have demonstrated proper use of the standards and test equipment to include the determination of the appropriate measurement uncertainty. A list of laboratory standards and equipment are maintained in the laboratory and at NIST.

Calibrations of Primary Standards and Equipment

Primary standards and equipment are recalibrated on a periodic basis as needed by a national measurement laboratory or a laboratory that has achieved recognition or accreditation through a recognized accrediting body. The calibration reports are maintained in the Arizona Metrology laboratory and at NIST.

Measurement Traceability of Primary Standard and Equipment Calibration Providers

In the event where standards and/or equipment are not calibrated by a national measurement laboratory or a laboratory that has achieved recognition or accreditation through a recognized accrediting body, the laboratory takes steps, where appropriate, to ensure that the calibration provider's measurements are traceable. Steps for ensuring measurement traceability are (1) auditing and documenting the traceability of the calibration provider, (2) investigating the traceability chain of any additional laboratories used by the calibration provider (i.e., the calibration provider submits standards and equipment, used for your calibration, to another calibration laboratory), and/or (3) obtaining appropriate information from the calibration provider to include the calibration providers internal audits, calibration procedures, the equipment and standards used, the laboratory environmental conditions, and the methods for determining measurement uncertainties.

NIST-WMD Measurement Assurance Program

In addition to verification of primary standards, calibration, and traceability, the following information is pertinent to an audit of the Arizona Metrology Laboratory. The NIST Weights and Measures Division provides a Measurement Assurance Program for State laboratories. The Arizona Metrology Laboratory is currently recognized under this program for the period of 2003-2004. The Measurement Assurance Program is limited to government laboratories involved in support to regulatory weights and measures programs in specific measurement areas. Technical criteria that are used to evaluate the laboratories are described in NIST Handbook 143, State Weights and Measures Laboratories, Program Handbook and incorporate ISO Guide 25 and ANSI/NCSL Z 540-1-1994. Specific laboratories and measurement parameters are detailed in Special Publication 791, State Standards Program Description and Directory, which describes the program. The measurement parameters for the Arizona Metrology Laboratory are detailed on its Certificate of Measurement Traceability.

Laboratory Measurement Assurance Activities

Descriptions of the measurement assurance activities of the Arizona Metrology Laboratory are as follows:

1) The Arizona Metrology Laboratory has a documented quality system that includes components of ISO Guide 25, ANSI/NCSL Z 540-1-1994 and ISO 17025 and is on file with the Weights and Measures Division. In addition, all procedures used in the laboratory are those that have been established and published by NIST. The standard operating procedures, good laboratory practices, and good measurement practices are provided in NIST Handbook 145 "Handbook for the Quality Assurance for Metrological Measurements." The latest quality manual on file at NIST is dated September 12, 2002.

2) The Arizona Metrology Laboratory staff regularly participates in regional metrology meetings of the South Western Regional Measurement Assurance Program, (SWAP), a regional measurement assurance group sponsored by the Weights and Measures Division of NIST to provide an opportunity for regular training and evaluation. Staff have regularly participated in the sessions of the National Conference on Weights and Measures (NCWM). Staff has also completed training to the Advanced level, as provided by the Weights and Measures Division. The most recent regional meeting attended was October 2002.

3) The Arizona Metrology Laboratory staff regularly participates in "round robin" measurements coordinated by NIST and SWAP as an external measurement control. Artifacts initially tested at NIST, are tested by the Arizona Metrology Laboratory to verify that the standards used to provide data to customers are traceable. The most recent measurements were made on mass and volume artifacts in 1999 and 2002 and were satisfactory.

4) The Arizona Metrology Laboratory has an extensive system of internal measurement assurance programs (based on control charts) that are computerized and are used to verify the values of primary standards and verify the values of working standards used to

provide measurement services.

5) The laboratory receives a site visit and audit by NIST Weights and Measures Division staff. The most recent visit was October 2001.

6) The Arizona Metrology Laboratory annually performs a self-evaluation and provides this information, to include measurement control chart data, round robin data, and scope of recognition to the Weights and Measures Division for annual evaluation. We received the laboratory material for review on November 13, 2002, which was adequate.

Calibration Reports

The Arizona Metrology Laboratory issues calibration reports, which include the following information:

- measurement result and the associated uncertainty or where appropriate, a compliance statement to identify metrological specifications,
- a traceability statement that the laboratory standards are traceable to national standards, and
- an explanation of how the uncertainty was determined to include at least the coverage factor and the confidence level that were used in the determination of the uncertainty.

Measurement Uncertainty/Traceability Documentation

The Arizona Metrology laboratory calculates measurement uncertainties in accordance with NIST WMD Standard Operating Procedure 29, which is in conformance with the ISO "Guide to the Expression of Uncertainty in Measurement."

The Arizona Metrology laboratory maintains a documented, unbroken chain of comparisons for its laboratory standards back to a standard that is acceptable to the parties, usually a national or international standard. The measurement uncertainties are documented for each step in the chain and the overall uncertainty for the entire chain is calculated.